spikelets and Trinius's description that his *Vilfa gracilis* is identical with *Agrostis juncea* of Michaux, although on the following page of the same work Trinius considers *Vilfa juncea* (Michx.) as a distinct species, evidently, however, basing his description mainly on South American material which was probably not the true *Agrostis juncea* of Michaux. Through an error Trinius published a second species of *Vilfa* under the specific name *gracilis* in the same work, page 82, which, however, is a synonym of *Sporobolus brevifolius* (Nutt.) Scribn. In indexing this volume Trinius discovered his error and applied a new name *Vilfa subsetacea*, page 111, to his first *Vilfa gracilis* rather than to the second and hence *Vilfa subsetacea* becomes a synonym of *Sporobolus gracilis*. In Britton's Manual Mr. Nash applied the name *Sporobolus ejuncidus* to this species, owing to the fact that the name *Sporobolus junceus* was untenable because Michaux's original publication of the species sub *Agrostis*, was antedated by *Agrostis junceus* Lam. According to the above note this name becomes a synonym, as the species already had two available names, *Vilfa gracilis* and *Vilfa subsetacea*.

Washington, D. C.

MISCELLANEOUS NOTES ON NEW ENGLAND FERNS, — IV.

George E. Davenport.

Note 7. The Evergreen Ferns of New England.— A winter study. This note is intended as a guide to the study of those ferns which remain green, or nearly so, through the winter and early spring, when the frequently occurring intervals of mild weather afford numerous opportunities for studying them to advantage.

With the disappearance of the late autumn foliage from the hills and woodlands, the rocky ledges stand out in bolder relief, exposing to view the great masses of polypody that fringe the boulders with their dark green fronds; the marginal shield ferns that crouch low at their bases for shelter, and the tiny spleenworts that have been hiding away securely in the crevices of the cliffs through all the summer season. In the woodland swamps, when free from snow, the

prostrate forms of the large ferns are exposed to view, and then is a good time to study the crowns and crosiers.

Then too is a good time to search for abnormal forms of the polypody, which in England produces so many remarkable variations. Among the countless thousands of plants distributed throughout our New England woodlands one may well expect to find many interesting forms, which, while they might not be of any great importance from a taxonomic standpoint, would yet be of some interest biologically, and help to increase our knowledge of the causes for plant variation.

It may be objected to the treatment adopted in this study, that, being based largely on the character of the rootstock, it may lead to the extermination of rare ferns by the taking up of plants; but this need not necessarily follow. The rootstocks of nearly all of our ferns can be studied without disturbing them enough to retard their growth, and with proper precautionary instructions it will be found that those who realize the importance of protecting and preserving our native plants will be less liable to destroy them through this method than they would be through any other. Thus this method may even become a valuable medium for aiding in the preservation of rare plants.

Roughly grouping our New England Ferns by their most obvious characters for the convenience of a ready recognition we may separate them into two sections as follows:—

I. EVERGREEN, or partially so, at least as to the late sterile fronds. Fronds more or less persistent through the winter.

II. NOT EVERGREEN. Fronds withering away on the approach of winter.

These sections may each be subdivided into three divisions based on the nature of the rootstock in accordance with the following arrangement.

DIVISION A.— ROOTSTOCK RHIZOMATOSE, *i. e.*, having the character of a rhizome — a running stem. Fronds more or less scattered; crosiers (frond-buds) usually isolated.

DIVISION B.— ROOTSTOCK CAUDICIFORM, *i. e.*, short, stout, and having the form of a caudex. Fronds fasciculate, *i. e.*, clustered at the growing end. Here occur two forms namely: with the rootstock, in the one case, *erect*, or partially so, growth upright; and in the other, *decumbent*, growth lateral, extending horizontally.

Division C.— Rootstocks caespitose, *i. e.*, forming tufts or little bunches.

As this guide is intended especially for winter and early spring use, only the first section (with more or less evergreen fronds) will be considered here.

Under Division A (with rootstock rhizomatose) we have the following ferns: —

* Fronds climbing; rhizome long and slender; stipes and flexuose rachises twining on shrubbery in rather open woodlands.

1. Lygodium palmatum, Swartz. Climbing Fern. Sterile portion persistent, fertile portion perishing; pinnae palmately divided, or lobed. N. H., Mass., Ct.

* * Fronds not climbing, green all winter, stipes articulated to a moderately stout scaly rhizome.

2. Polypodium vulgare, Linnaeus. Common Polypody. Abundant on boulders, ledges and rocky hillsides. Me., N. H., Vt., Mass., R. I., Ct.

Obs.— Var. *cambricum* has been found in Connecticut (*Dr. Underwood*) and New Hampshire (*Mrs. F. G. Webster*), and some very interesting abnormal forms have been collected in Vermont by Miss Slosson.

Under division B (Rootstocks caudiciform). Plants large.

* Rootstock erect, or partially so, growth upright.

3. Nephrodium marginale, Richard (*Aspidium*, Swartz).— Marginal Shield-fern. Fronds once or twice pinnate, margins entire or crenate; sori marginal. Rocky hillsides with no. 2, ravines and swampy woodlands with 4, 5 and 6. Me., N. H., Vt., Mass., R. I., Ct.

One or two forms have been designated but appear to me little more than states of development.

4. Nephrodium cristatum × marginale, Davenport. Fronds resembling no. 3 in the upper portion, and no. 5 in the lower; lobes toothed more as in no. 5. Sori sub-marginal or medial. Found always with no. 3 and no. 5 between which it is a natural hybrid, as Miss Slosson has successfully demonstrated by raising it by artificial crossing from spores. Me., Vt., Mass., R. I., Ct.

Obs.— Under favorable conditions fertile fronds of nos. 3 and 4 remain green nearly all winter. It may be well to add, however, that, as is the case with nearly all of these ferns, both fertile and sterile fronds, when surviving, become flaccid in autumn and lie prostrate through the winter, becoming more or less discolored.

* * Rootstock decumbent, growth lateral, extending horizontally.

5. NEPHRODIUM CRISTATUM, Richard (*Aspidium*, Swartz). Late sterile fronds remaining green all winter, fertile fronds withering gradually, long lanceolate with nearly triangular deeply pinnatifid pinnae, normally acute, or obtuse at the apex, but in var. *Clintonianum* long acuminate; lobes in both forms bluntly toothed; sori medial, or nearly so. Low swampy woodlands. Me., N. H., Vt., Mass., R. I., Ct.

Obs.— In var. *Clintonianum* the rootstock is much stouter, and the crowns are more loosely built up as it were, the crosiers overlapping one another irregularly much after the manner of the knuckles on a half closed hand. The large ovate and lanceolate scales with which the crosiers are clothed shade from light amber to dark brown in both forms, and on old fronds the rounded backs of the stipes shade to blackish brown.

An interesting form with apparently strictly herbaceous fertile fronds that perish altogether in early autumn has been collected in Vermont by Miss Margaret Slosson for several years, and may prove to be distinct; however as some sterile fronds on two or three plants of it that have been growing on my own grounds are still green at present writing (Feb. 5th), I am not ready to accord to it specific rank; I have, however, provisionally named it *Nephrodium cristatum*, Rich., var. **Slossonae,** n. var. Fully matured plants of this form are quite as large as, if not larger, and with broader fronds than *var. Clintonianum*; the texture is thinly herbaceous and the sori are arranged in a close costal series much as in *Nephrodium Goldieanum*, from which, however, it is wholly distinct. I shall have more to say about it at another time.

A conspicuous feature in all of the *cristatum* forms in winter is seen in the deeply sunken blackish grooves in the upper coriaceous surfaces, and the elevated lines beneath which mark the course of the venation.

6. NEPHRODIUM BOOTTII, Davenport in Gilbert, Catl. 1901 (*Aspidium*, Tuckerman). Fertile fronds on my grounds at present

writing (Feb. 5th) brown and withered, but stipes partially standing; sterile fronds prostrate and green. Normal fronds broadest above the middle, resembling no. 5 below, and no. 7β above, the lobes more deeply toothed than in no. 5, and less sharply so than in no. 7β. Indusium when found finely glandular. Swamps with nos. 5 and 7, Me., N. H., Vt., Mass., R. I., Ct.

7. NEPHRODIUM SPINULOSUM Desvaux (*Aspidium* Swz.). Fronds with the divisions all *spinulosely* toothed, and more deeply cut than in other members of the group. Widely distributed in various situations, Me., N. H., Vt., Mass., R. I., Ct.

Many forms of this protean species have been found, but the following are all that appear worthy of permanent recognition.

α. Normal form.— Whole frond smooth, pinnae obliquely set to the main rachis, the lowermost pair shortest; sori terminal on the veinlets which terminate *within the radius of the fruit-dot* (*sorus*); indusia smooth; scales of the crosiers light brown.

β. Var. *intermedium*, Davenport. Divisions of the lamina more finely cut, pinnae spreading at right angles; *under surfaces and indusia finely glandular* especially along the darker rachises and midnerves; sori below the apex of the veinlet which extends beyond the radius of the fruit-dot; scales of the crosiers darker.

γ. Var. *dilatatum*, Baker. Nearly as in α, but much larger every way, the mountain forms being broadly triangular ovate; *sori* below the apex; scales on the crosiers dark with blackish centres on some of the largest forms.

Obs.— As is well known *Nephrodium dilatatum* is considered by English authors generally as being a wholly distinct species from *N. spinulosum*, and even Moore, who yet regarded *spinulosum* as a mere variety of *cristatum*, so treated it under *Lastrea*, describing several forms as varieties. His description of *var. tanacetifolia* "fronds ample, triangular or sub-triangular ovate, tri-quadri-pinnate; scales of the stipe dark-centred" (Native Printed Ferns 1, 225) exactly fits our mountain forms from New Hampshire and Vermont; but Moore's forms are all described as having *glandular indusia*, whereas in our form the indusium is smooth as in α.

8. POLYSTICHUM ACROSTICHOIDES, Schott (*Aspidium*, Swartz). Christmas Fern. Whole plant remaining green, or nearly so; fertile fronds contracted above the middle, the tips only perishing; pinnae auricled at the base, *spiny toothed*. Rocky hillsides and ravines, Me., N. H., Vt., Mass., R. I., Ct.

Obs.—As pointed out in my previous note (Rhodora, iv. 9) Polystichum is especially characterized by its densely opaque, or coriaceous texture, auricled pinnae and *aculeate* or *spiny* toothed lobes.

9. Polystichum aculeatum Swartz, var. Braunii Davenport (Rhodora, l. c.). Stipes and rachises thickly clothed with soft hairs and chaffy scales; crosiers densely covered with rich brown scales and chaff; margins of lobes aculeate. Mountain ravines, Me., N. H., Vt.

Under Division C (Rootstock caespitose). Plants small.

10. Pellaea atropurpurea, Link. Purple Cliff-Brake. Not strictly caespitose, but rhizomes short, moderately stout, and with the stipes so closely approximated as to appear tufted. Doubtfully evergreen with us unless in especially favorable situations. Miss Slosson writes me that she has found that it drops its pinnae in winter, "the stipes and rachises remaining." Needs further investigation and the winter season is a good time for it. Limestone cliffs, N. H., Vt., Mass., R. I., Ct.

11. Asplenium Trichomanes, Linnaeus. False Maiden-hair. Fronds all alike, narrowly linear, pinnate; stipes and rachises black, or purplish black, and shining. Rock crevices, Me., N. H., Vt., Mass., R. I., Ct.

12. Asplenium viride, Hudson. Green Spleenwort. Resembling no. 11, and in similar situations, but with stipes and rachises green. Vt.

13. Asplenium ebeneum, Ait. Ebony Spleenwort. Sterile fronds in rosette-like clusters at the base of the taller erect fertile fronds; stipes and rachises purplish black and shining, or in *var. Hortonae*—a sterile form with plumose fronds—reddish. With no. 11, Me., N. H., Vt., Mass., R. I., Ct.

14. Asplenium ebenoides, R. R. Scott. Fronds more or less distorted, and sometimes proliferous. A natural hybrid between nos. 13 and 17 with which it has always been found growing and to be looked for wherever those two ferns are plentiful in close proximity to one another. Vt. (*Eggleston, Woolson & Swift*), Ct. (*Adam*).

15. Asplenium montanum, Willdenow. Mountain Spleenwort. Fronds ovate-lanceolate and much incised. A comparatively recent addition to our New England fern-flora, and as yet little known. Limestone cliffs, Ct.

16. Asplenium Ruta-muraria, Linnaeus. Fronds deltoid, with wedge-shaped divisions, Limestone cliffs, N. H., Vt., Mass., Ct.

17. Camptosorus rhizophyllus, Link. Walking Leaf. Fronds undivided, with prolonged proliferous tips; abnormal forms not infrequent. Limestone cliffs, but also on other formations. Me., N. H., Vt., Mass., R. I., Ct.

This completes the evergreen true ferns of New England, but in old meadow lands, about hummocks and shrubbery, on springy hillsides, or in low woodlands, when free from snow, in many places may be found the ternate fleshy sterile forms of *Botrychium ternatum*. So also may be found the handsome furrowed stems of the scouring rush (*Equisetum hyemale* L.) and several forms of club moss (*Lycopodium*), and *Selaginella*.

Note. In the preparation of this matter I have been greatly indebted to Miss Slosson for many valuable observations which it gives me pleasure to acknowledge here.

Medford, Massachusetts.

OUR CHOKEBERRIES.

W. H. Blanchard.

The compilers of the Flora of Vermont could find no authenticated specimens of the Red Chokeberry, *Pyrus arbutifolia*, L., and so left it out, though the Black Chokeberry was given as common. On May 26, 1900, I found the Red Chokeberry on Rocky Hill in Westminster, Vermont, about two miles from the Connecticut River. While I felt sure I had found the typical plant and no variety or "form," I sent it to Pres. Brainerd and Mr. Fernald to have it compared with authenticated specimens. Both pronounced it a normal plant of the type form. So Vermont botanists can add another plant to our growing list.

Some of my observations on both of our Chokeberries are here given. They seem to indicate that these plants are variable in several respects and may interest botanists. The plants have an abundance of Latin names, some of them indicating that the color of the fruit has been considered to be practically uniform.

The Illustrated Flora describes the Red Chokeberry as from five